

P38 Range Rover viscous coupling replacement.

I could not find many photos of this job in progress, so I thought I'd share my experience for the benefit of others.

First things first, have the correct tools at hand.

- 30mm socket and breaker bar/ extra pipe for the flange nut.
- 9/16 & 14mm open end spanners for the drive shaft flanges
- Gear puller for the transfer case flange (mine is a 75mm).
- 15mm socket, ratchet and extension for viscous housing bolts.
- 15mm & 13mm spanners
- Shop hydraulic press if possible (job can be done without a press).
- Correct silicone for reassembly

The following is taken from the ashcroft transmission instructions:

How to fit a viscous coupling unit

- 1) Remove front prop shaft
- 2) Drain oil from transfer box
- 3) Support gearbox and remove right hand gearbox mount
- 4) Remove bolt holding Viscous Coupling housing to transfer box
- 5) Rotate, to break silicone, and remove Viscous Coupling housing
- 6) Remove flange nut and flange and press out Viscous Coupling
- 7) Clean all joint faces
- 8) Replace Viscous Coupling and reassemble in reverse order

1) First off remove the front drive shaft. The drive shaft bolts are 9/16, or a tight fit with a 14mm spanner. I got a longer than normal spanner to give some extra reach behind the cross member for the transfer case end of the shaft.

I found the longer 14mm on the bolt side held on well, and used the 9/16 on the nut side as it is easier to reposition after each turn. On the rear flange, if you get the shaft at just the right position it helps to give you a bit of extra movement with the spanner as shown.



As with any under vehicle job, getting yourself in a good working position will make things easier. I also put some cardboard under the vehicle to make sliding around easier while underneath, and to help keep my garage floor clean.

My viscous coupling was seized, so I ended up rolling the vehicle back a bit after each bolt, to enable access to all the nuts at both ends.

Some people really struggle with removing the drive shaft, it can be a tough one, but just persist and you will work out your own system of getting all the bolts off.

I had my drive shaft balanced to correct a wobble which was causing vibrations, including two new universal joints, well worth having that done, like new!





Once the shaft has been removed, you can see the flange bolt hiding above the cross member, with the viscous coupling housing behind that.

2) Drain transfer case.

Easy enough, the end of a 1/2 inch ratchet fits straight in to the drain plug. Let it drain and refit plug.



3) Support gearbox and remove cross member.

I have read this job is possible without removing the cross member. I considered leaving the cross member in place, but I do suggest removing it, makes the job much easier in the long run, especially during reassembly. It took me about 20 minutes to undo all 14 nuts and bolts to get it out. I had a heavy hammer on hand to get the cross member moving.

I've read of people having trouble refitting the cross member, but fortunately mine went back in easily, you just have to make sure it does not go back in on any angle, it needs to be flush so both ends go back into place evenly.

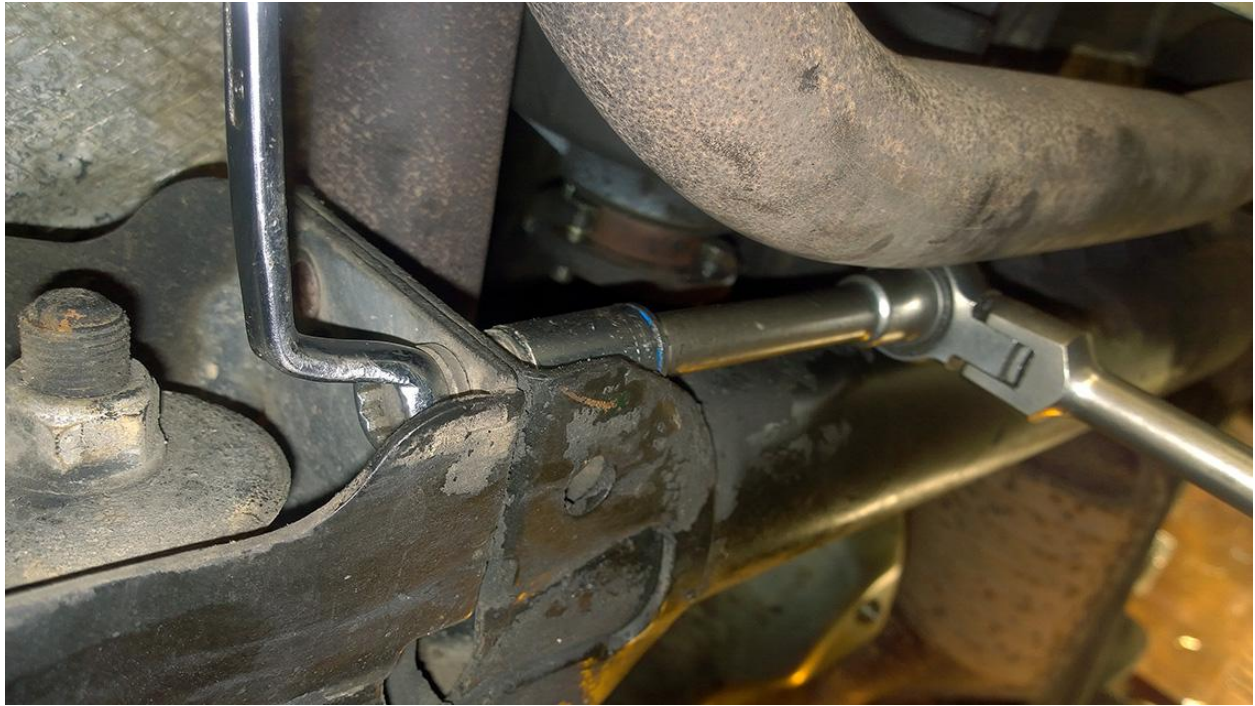
I used a jack and some wood to support the gear box, just to take the weight while the cross member is off.





15mm socket with an extension needed here. The 2 middle bolts are attached to a small 'snubber' bar, which fits over the top. It comes out easily once undone.





13mm ring spanner on the bolt end here, 15mm socket on the nut. Once everything is undone, it will require some gentle persuasion with a heavy hammer to get it moving. It will move fairly easily, just ease it out as straight as you can at both ends. It's not very heavy to handle once it's off.

4) Remove bolt holding viscous coupling housing to transfer box.

I thought it best to remove the flange bolt first, but I did not have my breaker bar with me, so I improvised with a ratchet and a length of water pipe as leverage. The trick here is to get out from underneath, get your feet onto the pipe and push with your legs! It came undone pretty easily with that method. 30mm socket required here. I did not need to brace the flange.



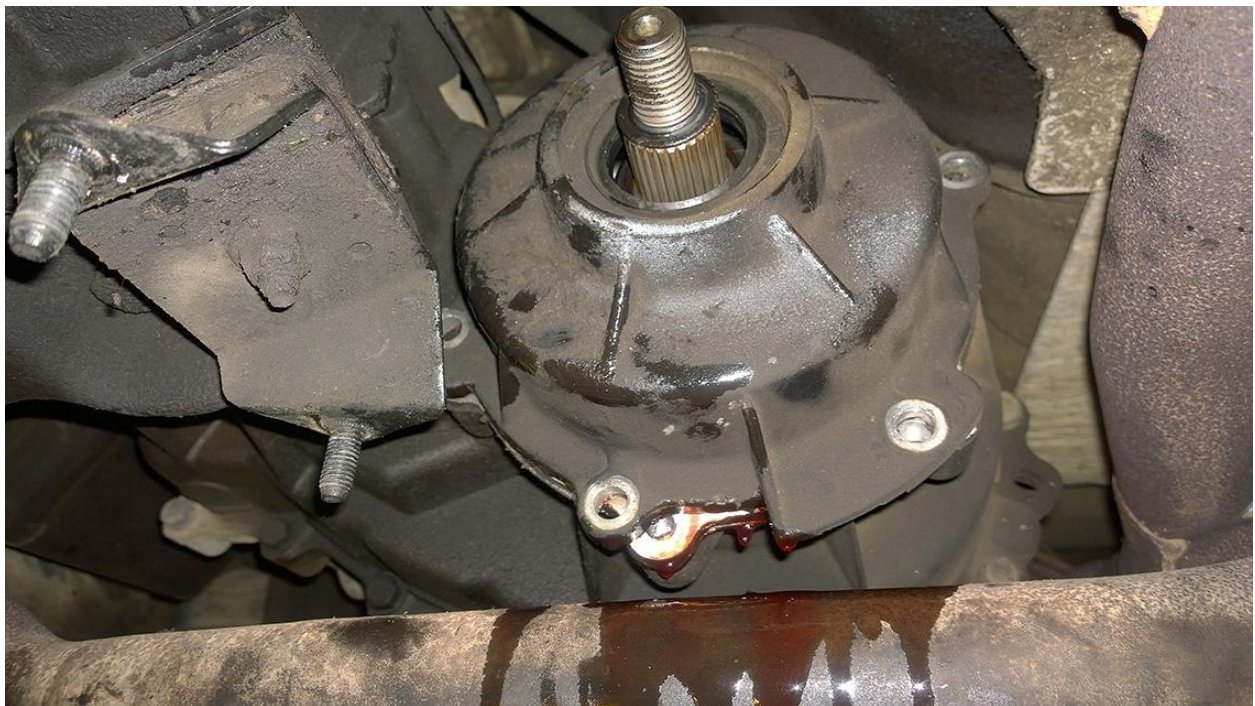
Next step is a 75mm gear puller to remove the flange. Mine came off pretty easily.





Next remove the 6 bolts around the vc housing. 15mm socket required and maybe an open end spanner for the left most bolt which is in a tough spot.

Once undone, a tap with a hammer and punch from behind will release the housing. Be ready for some stray ATF to leak out.



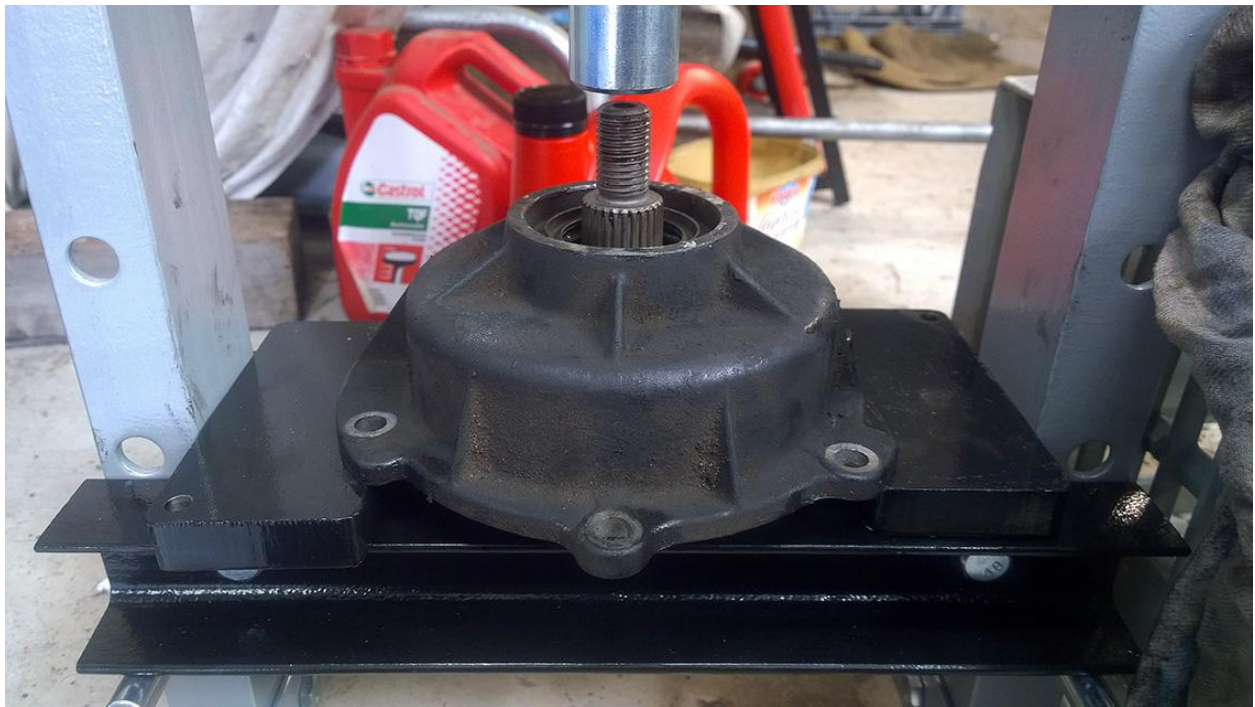
I had to give the VC shaft a few taps on the sides, top and bottom with a hammer to get it to release from the shaft. Once released it comes off easily.

At last! VC removed. You can get out from underneath for a while now.

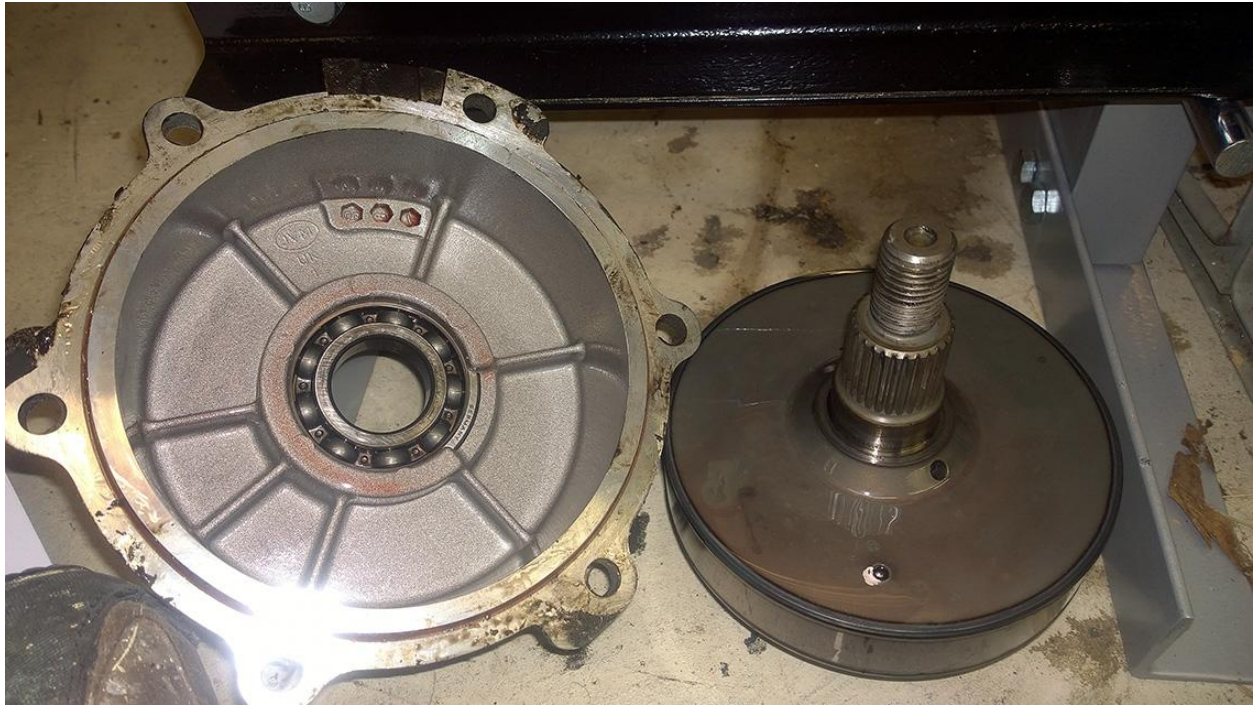


6) Remove flange nut and flange and press out Viscous Coupling

I got a 6000kg shop press on sale, I've wanted one for a while and this seemed like a good excuse to get one. It made the job a breeze, worth every cent.

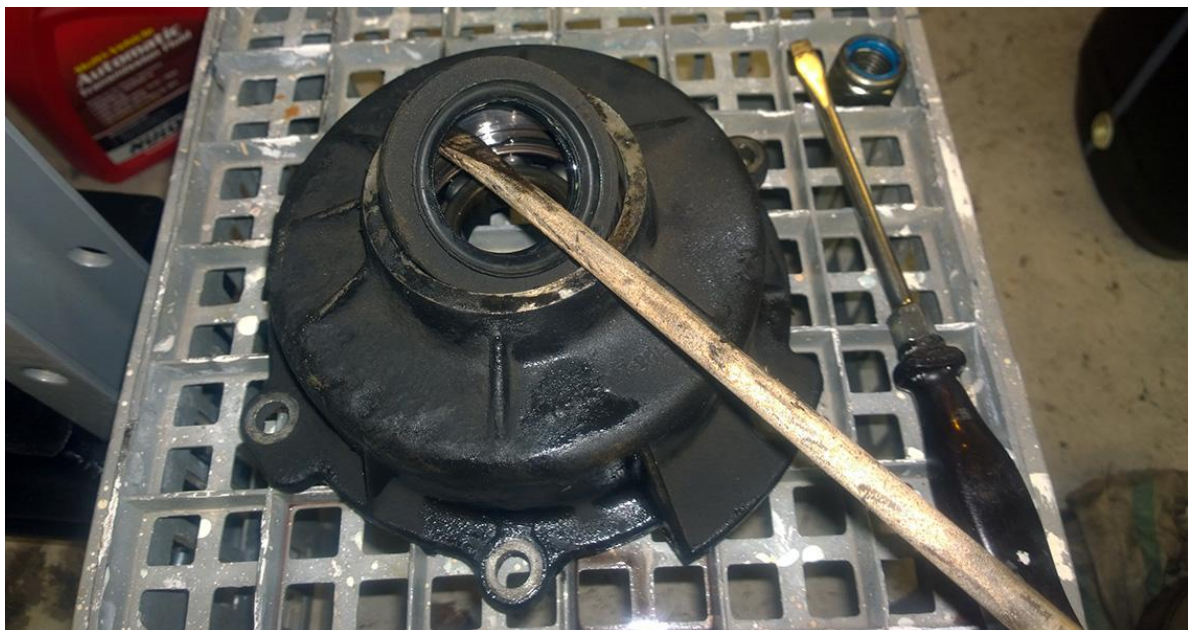


The VC pressed out very easily with the press.

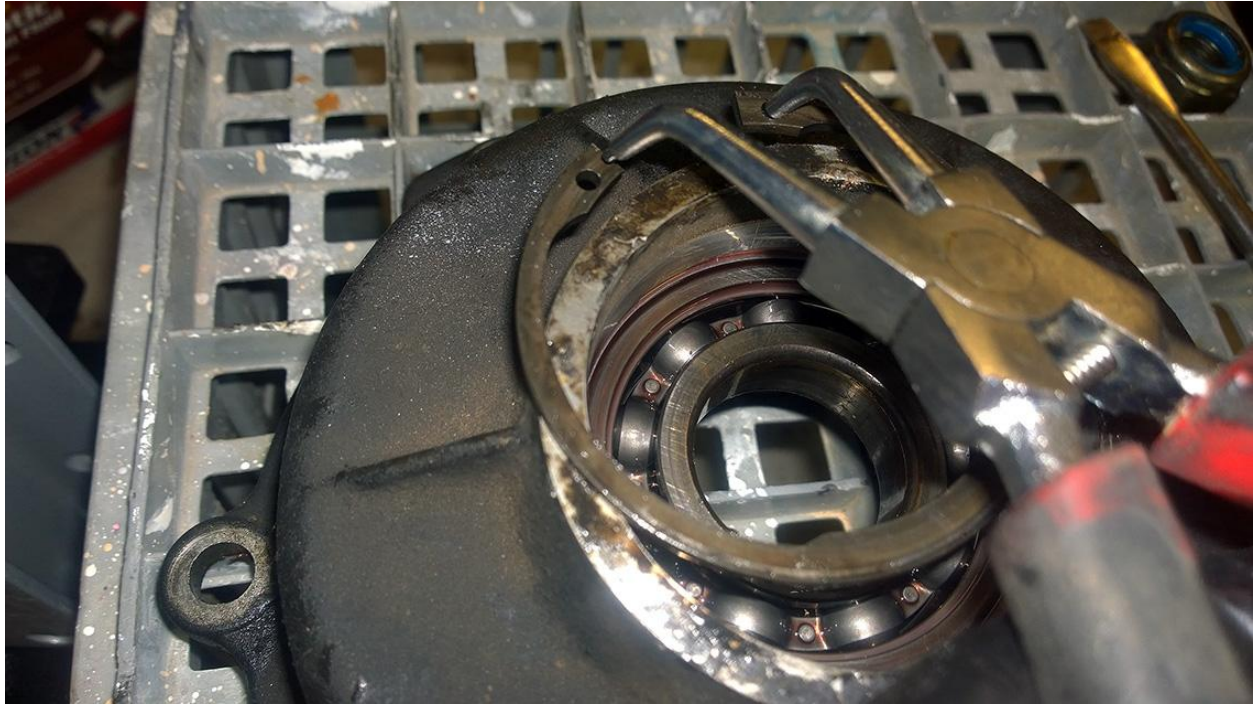


The old VC pressed out of the housing, you can see the bearing which I also replaced while I had it apart.

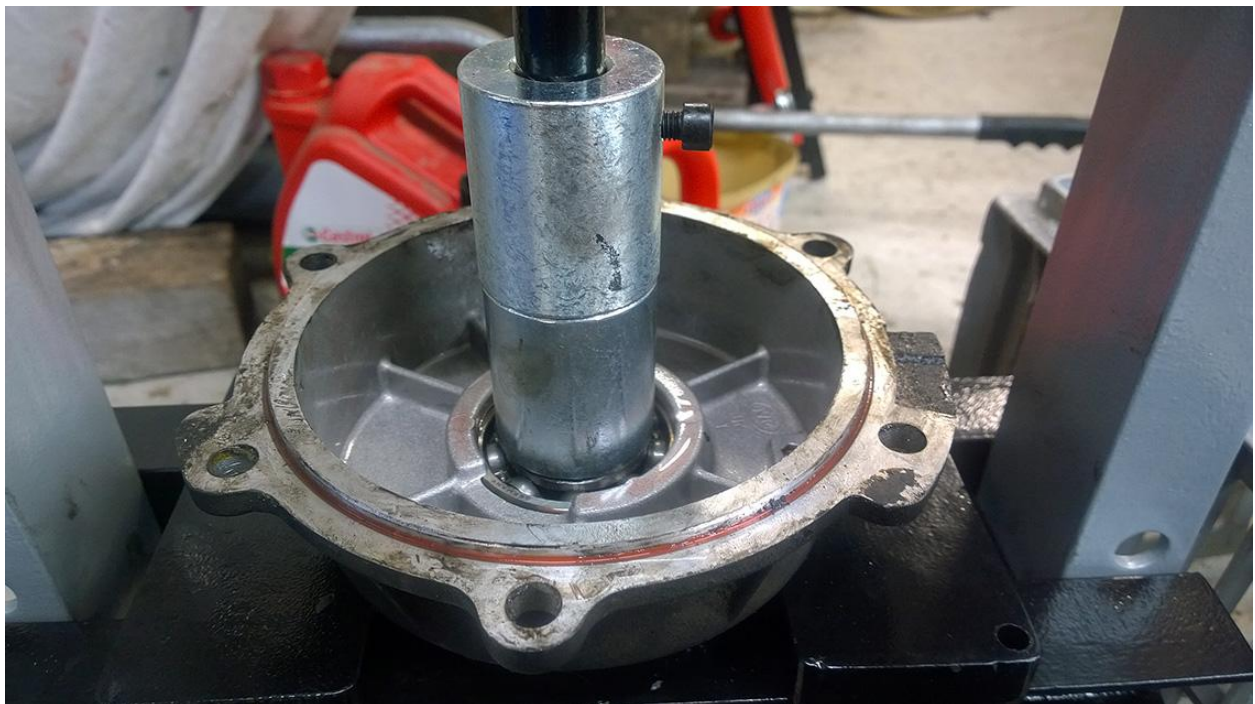
Next remove the oil seal. Flip the housing over and a long flat blade screw driver will lever the old seal out with ease.



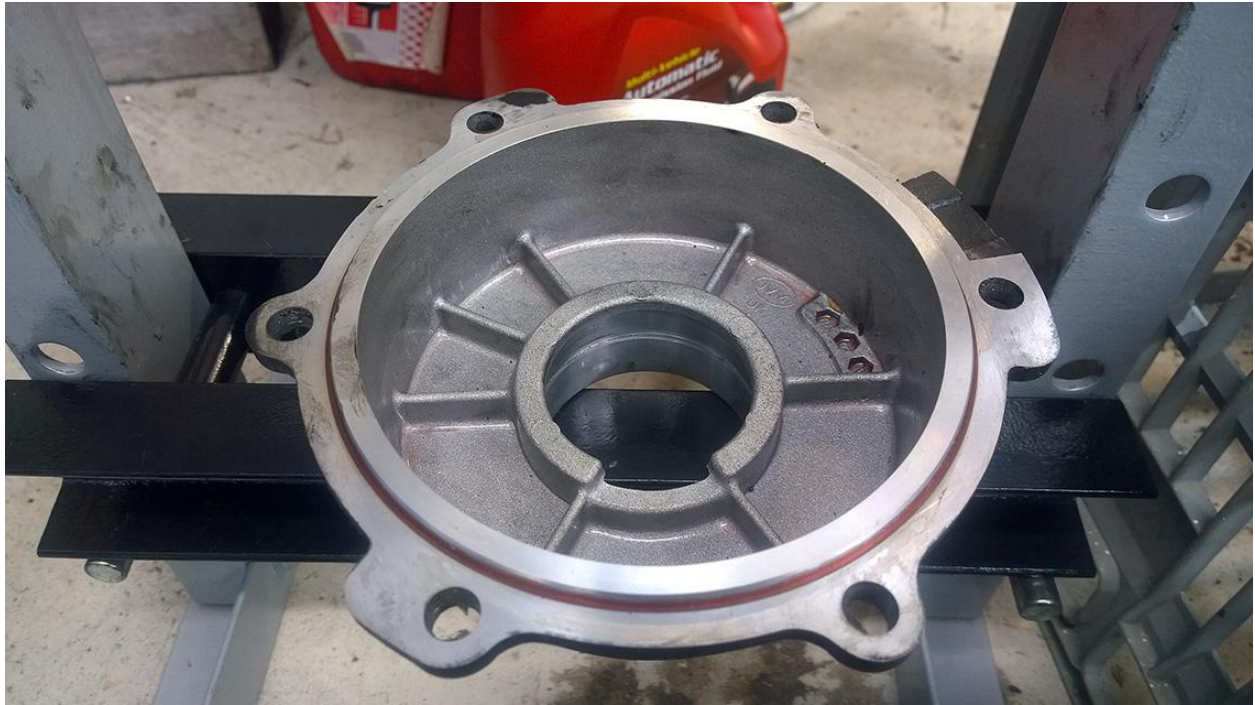
I replaced my output bearing as well while it was apart. The bearing had some movement, so it was a good opportunity. Some circlip pliers are needed to remove the large circlip that holds the bearing in place.



Next press out the old bearing.



Housing with everything removed.



Top view.



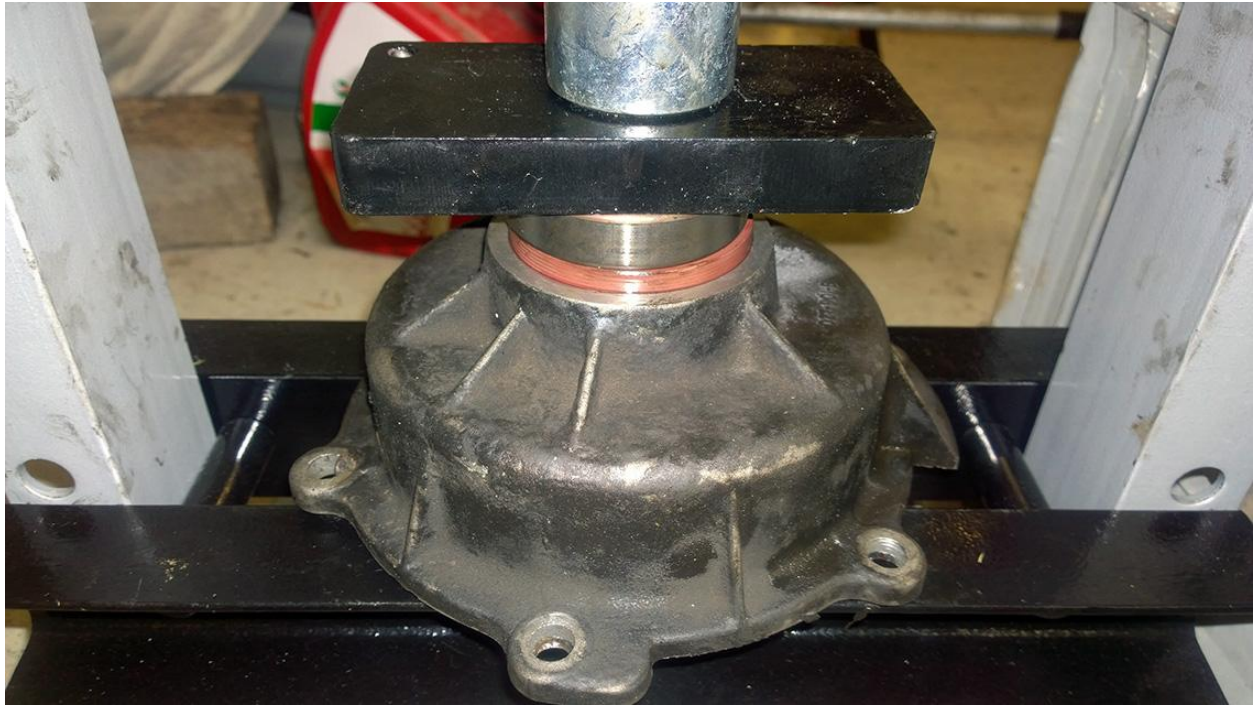
Next press in the new bearing on the outer race only, you can damage the bearing if you press the center part.



Replace the circlip.



Press in the new oil seal.



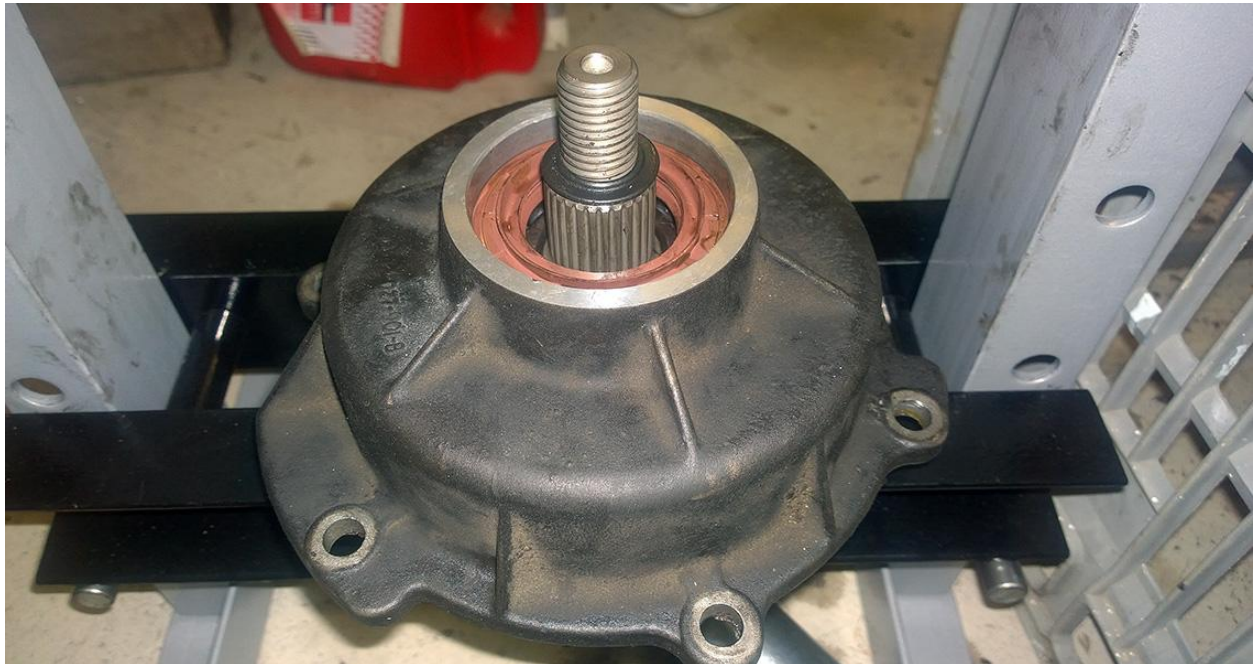
Oil seal correctly seated.



Next flip the housing over and press the new VC unit into the bearing.



New VC pressed into place.



Time to start reassembly.

7) Clean all joint faces.

Properly clean the mating faces and apply a 2mm bead of correct grade silicone around the face, inside the bolt holes.



8) Replace Viscous Coupling and reassemble in reverse order

Trying your best to keep the mating faces clean, align the VC onto the shaft. It has to be in the right position to go on, you may need to wobble it around a bit to get it to engage with the shaft, but once it engages at the right angle, it will slide on easily. Take note where the bolt holes originally lined up and move the housing into position. Note the protruding part of the case on the right hand side to help you align it properly. Try to only push the mating faces together once, so the silicone bead does not get too disturbed.



Next replace all the bolts and do them up with your hand as much as you can where possible. Next a 15mm socket on an extension will nip them up loosely.

The nut on the middle left (looking at it from the front) is in a tough spot, a 15mm open end spanner, or maybe a racheting spanner is a big help with this one.

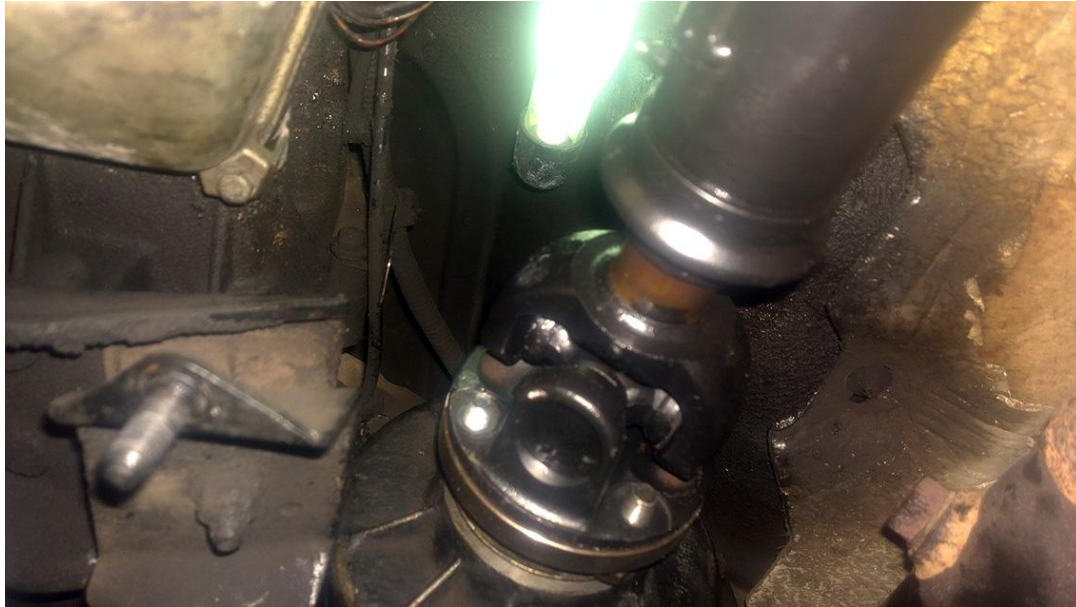
Next torque up all 6 housing bolts to 26 Ft/Lbs, (35Nm). I used the star pattern order to torque the bolts to distribute the tension evenly.

Please check torque values for your model, mine is a 2001 HSE. These values are taken from the rave manual.

Next torque up the flange bolt to 162Ft/Lbs (220Nm) I used the same leg method as undoing. I did not need to brace the flange, but I did make sure the handbrake was applied before tightening.



Next I located the drive shaft onto the flanges, loosely doing up a couple of bolts on each end so it didn't fall off. I figured it was easier to do that before the cross member went back on.



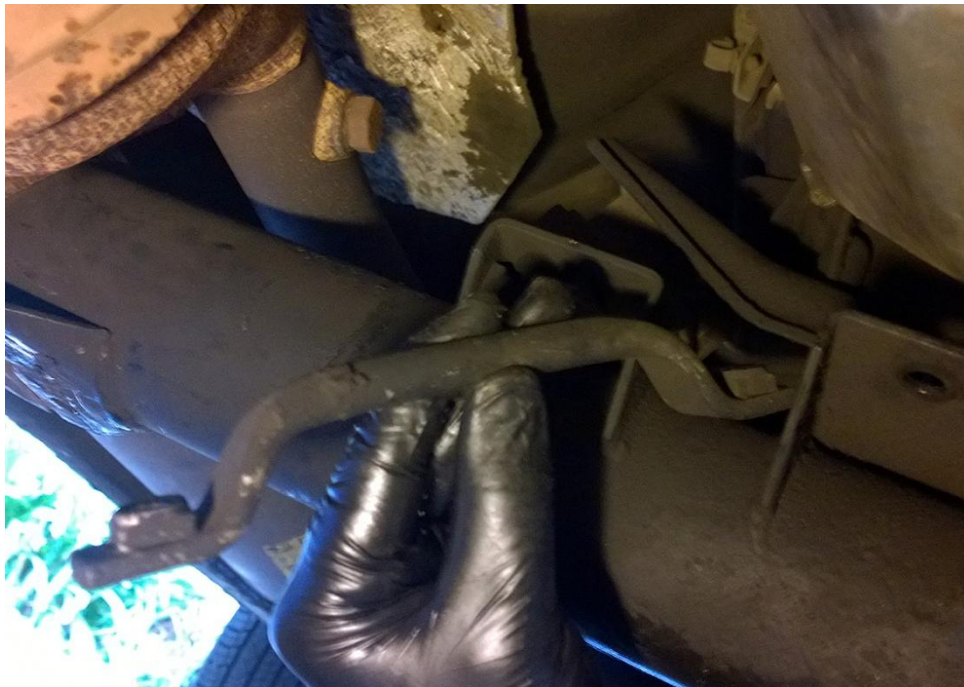
Next refit the cross member, it has to go in evenly at both ends. Mine went in without any trouble. You will need a heavy hammer to tap it back into position and line up the bolt holes. Once I got one bolt through, I put the next bolt in the hole and tapped the cross member until that bolt went through. I have heard of people having to use a jack and blocks of wood to separate the chassis slightly to get the cross member to go back into position. I'm glad I didn't need to do that.



Then refit the mount bolts and nuts, torque to 33Ft Lbs (45Nm).



I did the snubber bar last, it goes through a hole above the center of the cross member, the 2 bolts thread into each end of it.



Next remove the jack that was supporting the transmission, then attach and tighten the drive shaft flange bolts at front and rear. You will be getting tired at this stage, be patient, you are nearly there! Again I ended up rolling the vehicle forward to access each nut in turn.



Last but not least, refill the transfer case with correct ATF and refit the plug.



JOB DONE! It took me about 6 hours all up. What a difference that has made to the feel of the vehicle, much tighter and smoother in the driveline. I hope this is of help to anyone who has not tackled this job before. I could not find much in the way of photos, so I thought I'd do up my own procedure with lots of photos.

The RAVE manual is a good help, I printed off the following pages:

1) Workshop manual/Chassis and Body/Chassis cross member

Overhaul manuals/Transfer boxes/Borg Warner/Overhaul:

2)front output shaft drive flange,

3) Front output oil seal,

4)front output shaft bearing,

5)viscous coupling unit (VCU).